

WHAT IS CLAIMED IS:

5

1. An optical disk device recording data on a recordable or rewritable optical disk, the device comprising:

- zone storing means for preliminarily storing
10 locations of a plurality of zones set by dividing a recordable or rewritable area of said optical disk from an inner periphery thereof to an outer periphery thereof;
- position detecting means for detecting a
15 position on said optical disk so as to record data at said position;
- judging means for judging which of said zones said position corresponds to by referring to said zone storing means; and
- 20 controlling means for controlling the device to perform a data-recording by a CLV method to each of the zones specified by said judging means by setting a recording velocity and a recording power for each of the zones so as to enable the data-recording to provide an
25 equal recording density to all of the zones.

47,39, 47,4, 47,51
47,53

2. The optical disk device as claimed in
claim 1, further comprising:

first recording power determining means for
determining the recording power in a first zone of said
5 zones by performing an OPC (Optimum Power Calibration)
in a test-writing area on said optical disk at a
recording velocity preliminary set for said first zone,
said data-recording being first performed to the first
zone; and

10 second recording power determining means for
determining the recording power in one of other zones of
said zones by multiplying said recording power
determined by said first recording power determining
means by a predetermined constant.

15

3. The optical disk device as claimed in
20 claim 1, further comprising:

pausing means for pausing said data-recording
when said data-recording is performed to an end of one
of said zones;

25 stabilizing means for stabilizing a revolving
system of said optical disk so as to perform said data-

PENDING PCT APPLICATION

recording to a next zone of said zones at the recording velocity corresponding to said next zone when said pausing is performed, said data-recording being next performed to the next zone; and

- 5 restarting means for restarting said data-recording from a start of said next zone after said stabilizing is finished.

10

4. The optical disk device as claimed in
claim 3, further comprising timing means for timing said
restarting by counting a frame sync clock obtained by
15 reading the data recorded on said optical disk
immediately before said pausing.

20

5. The optical disk device as claimed in
claim 1, wherein said data-recording is performed by one
of a TAO (Track at once) recording mode and an SAO
(Session at once) recording mode, and
25 said zone storing means stores a boundary

2002-06-11 14:58:34

between tracks on said optical disk as a boundary between said zones in said TAO recording mode, and stores a boundary between sessions on said optical disk as the boundary between said zones in said SAO recording mode.

5

10 6. The optical disk device as claimed in claim 1, wherein said data-recording is performed by packet-writing, and

 said zone storing means stores a boundary between said zones in a link sector of a packet.

15

7. An optical disk device recording data on a recordable or rewritable optical disk, the device comprising:

 first controlling means for controlling the device to perform a data-recording by a CAV method so as to provide a constant recording density;

25 detecting means for detecting an occurrence of

a cause of a recording error;

pausing means for pausing said data-recording when said occurrence is detected; and

second controlling means for controlling the

5 device to restart said data-recording by a CLV method at a second recording velocity not exceeding a first recording velocity immediately before said pausing so as to provide a recording density equal to said constant recording density when said pausing is performed.

10

8. The optical disk device as claimed in
15 claim 7, further comprising restarting means for restarting said data-recording by said CAV method upon a fulfillment of a predetermined condition when said pausing is performed,

wherein said second controlling means controls
20 the device to restart said data-recording by said CLV method for the first time when said pausing is performed predetermined times.

25

9. The optical disk device as claimed in
claim 7, further comprising timing means for timing said
restarting by counting a frame sync clock obtained by
reading the data recorded on said optical disk
5 immediately before said pausing.

10 10. The optical disk device as claimed in
claim 7, further comprising:

first recording power determining means for
determining a recording power in a first zone by using a
test-writing area on said optical disk at an initial
15 recording velocity in performing said data-recording by
said CAV method, said data-recording being first
performed to the first zone; and

second recording power determining means for
determining a recording power used in performing said
20 data-recording by said CLV method by multiplying said
recording power determined by said first recording power
determining means by a constant predetermined according
to said second recording velocity in performing said
data-recording by said CLV method.

11. An information processing device comprising:

an optical disk device recording data on a recordable or rewritable optical disk, the device
5 including:

zone storing means for preliminarily storing locations of a plurality of zones set by dividing a recordable or rewritable area of said optical disk from an inner periphery thereof to an outer periphery
10 thereof;

position detecting means for detecting a position on said optical disk so as to record data at said position;

judging means for judging which of said zones
15 said position corresponds to by referring to said zone storing means; and

controlling means for controlling the device to perform a data-recording by a CLV method to each of the zones specified by said judging means by setting a
20 recording velocity and a recording power for each of the zones so as to enable the data-recording to provide an equal recording density to all of the zones.

12. An information processing device comprising:

an optical disk device recording data on a recordable or rewritable optical disk, the device

5 including:

first controlling means for controlling the device to perform a data-recording by a CAV method so as to provide a constant recording density;

detecting means for detecting an occurrence of
10 a cause of a recording error;

pausing means for pausing said data-recording when said occurrence is detected; and

second controlling means for controlling the
device to restart said data-recording by a CLV method at
15 a second recording velocity not exceeding a first
recording velocity immediately before said pausing so as
to provide a recording density equal to said constant
recording density when said pausing is performed.

20

13. An optical disk recording method for
recording data on a recordable or rewritable optical
disk, the method comprising:
25

the position detecting step of detecting a position on said optical disk so as to record data at said position;

the judging step of judging which of a
5 plurality of zones said position corresponds to by referring to location information stored preliminarily regarding said zones, the plurality of said zones being set by dividing a recordable or rewritable area of said optical disk from an inner periphery thereof to an outer
10 periphery thereof; and

the recording step of performing a data-recording by a CLV method to each of the zones specified by said judging step by setting a recording velocity and a recording power for each of the zones so as to enable
15 the data-recording to provide an equal recording density to all of the zones.

20

14. The optical disk recording method as claimed in claim 13, further comprising:

the first recording power determining step of determining the recording power in a first zone of said
25 zones by performing an OPC in a test-writing area on

said optical disk at a recording velocity preliminary set for said first zone, said data-recording being first performed to the first zone; and

- the second recording power determining step
5 for determining the recording power in one of other zones of said zones by multiplying said recording power determined by said first recording power determining step by a predetermined constant.

10

15. The optical disk recording method as claimed in claim 13, further comprising:

- 15 the pausing step of pausing said data-recording when said data-recording is performed to an end of one of said zones;
- 20 the stabilizing step of stabilizing a revolving system of said optical disk so as to perform said data-recording to a next zone of said zones at the recording velocity corresponding to said next zone when said pausing step is performed, said data-recording being next performed to the next zone; and

- 25 the restarting step of restarting said data-recording from a start of said next zone after said

stabilizing step is finished.

5

16. The optical disk recording method as
claimed in claim 15, wherein said restarting step
controls a timing of said restarting by counting a frame
sync clock obtained by reading the data recorded on said
10 optical disk immediately before said pausing.

15

17. The optical disk recording method as
claimed in claim 13, wherein said data-recording is
performed by one of a TAO (Track at once) recording mode
and an SAO (Session at once) recording mode, and
said judging step judges which of said zones
20 said position corresponds to by referring to location
information stored preliminarily regarding said zones,
the location information including a boundary between
tracks on said optical disk as a boundary between said
zones in said TAO recording mode, and a boundary between
25 sessions on said optical disk as the boundary between

said zones in said SAO recording mode.

5

18. The optical disk recording method as claimed in claim 13, wherein said data-recording is performed by packet-writing, and

10 said judging step judges which of said zones said position corresponds to by referring to location information stored preliminarily regarding said zones, the location information being stored in a link sector of a packet as a boundary between said zones.

15

19. An optical disk recording method for recording data on a recordable or rewritable optical disk, the method comprising:

the first recording step of performing a data-recording by a CAV method so as to provide a constant recording density;

25 the detecting step of detecting an occurrence of a cause of a recording error;

the pausing step of pausing said data-recording when said occurrence is detected; and
the second recording step of restarting said data-recording by a CLV method at a second recording
5 velocity not exceeding a first recording velocity immediately before said pausing so as to provide a recording density equal to said constant recording density when said pausing step is performed.

10

20. The optical disk recording method as claimed in claim 19, further comprising the restarting
15 step of restarting said data-recording by said CAV method upon a fulfillment of a predetermined condition when said pausing step is performed,
wherein said second recording step restarts
said data-recording by said CLV method for the first
20 time when said pausing step is performed predetermined times.

25

21. The optical disk recording method as
claimed in claim 19, wherein said second recording step
controls a timing of said restarting by counting a frame
sync clock obtained by reading the data recorded on said
5 optical disk immediately before said pausing.

10 22. The optical disk recording method as
claimed in claim 19, further comprising:

the first recording power determining step of
determining a recording power in a first zone by using a
test-writing area on said optical disk at an initial
15 recording velocity in performing said data-recording by
said CAV method, said data-recording being first
performed to the first zone; and

the second recording power determining step of
determining a recording power used in performing said
20 data-recording by said CLV method by multiplying said
recording power determined by said first recording power
determining step by a constant predetermined according
to said second recording velocity in performing said
data-recording by said CLV method.

23. A constant estimating method for
estimating a constant used in an optical disk recording
method for recording data on a recordable or rewritable
optical disk, the optical disk recording method
5 including:
the position detecting step of detecting a
position on said optical disk so as to record data at
said position;
the judging step of judging which of a
10 plurality of zones said position corresponds to by
referring to location information stored preliminarily
regarding said zones, the plurality of said zones being
set by dividing a recordable or rewritable area of said
optical disk from an inner periphery thereof to an outer
15 periphery thereof;
the first recording power determining step of
determining a first recording power in a first zone of
said zones at the innermost periphery of said optical
disk by performing an OPC in a test-writing area on said
20 optical disk at a first recording velocity preliminary
set for said first zone, a data-recording being first
performed to the first zone;
the second recording power determining step
for determining a second recording power in one of other
25 zones of said zones by multiplying said first recording

power by said constant, the data-recording being performed to said one of the other zones at a second recording velocity; and

- the recording step of performing said data-
5 recording by a CLV method to each of the zones specified
by said judging step by using one of said first
recording velocity and said second recording velocity
corresponding to each of said zones and one of said
first recording power and said second recording power
10 corresponding to each of said zones so as to enable said
data-recording to provide an equal recording density to
all of the zones, the constant estimating method
comprising:

- the OPC step of performing an OPC at said
15 first recording velocity so as to calculate said first
recording power in said first zone; and

- the estimating step of estimating said
constant by repeatedly performing a data-recording at a
recording velocity obtained by being variously
20 multiplied by a proper constant close to a value induced
from a relationship that, when a recording velocity is
doubled, a necessary recording power becomes $\sqrt{2}$ times
as large, and examining a recording state on said
optical disk after the data-recording.

24. An information recording device writing information in a circumferential direction of a disk-type recording medium with a substantially constant linear density, the device comprising:

5 test-writing means for performing a test-writing in a predetermined area on said disk-type recording medium at a predetermined basic linear velocity so as to determine an optimum recording power at said basic linear velocity according to a result of
10 said test-writing; and

 recording-power setting means for setting a recording power according to a result of a predetermined calculation performed to said optimum recording power, when a recording is performed on said disk-type
15 recording medium at a linear velocity different from said predetermined basic linear velocity.

20

25. The information recording device as claimed in claim 24,

 wherein said test-writing means includes optimum recording-state storing means for storing a
25 value in accordance with a reproduction signal

reproduced from said disk-type recording medium as an optimum recording-state targeted value, when a recording is performed on said disk-type recording medium with said optimum recording power; and

- 5 said recording-power setting means includes:
 recording-state targeted value setting means
 for setting a recording-state targeted value according
 to a result of a predetermined calculation performed to
 said optimum recording-state targeted value, when the
10 recording is performed on said disk-type recording
 medium at the linear velocity different from the
 predetermined basic linear velocity; and
 power correcting means for correcting said
 recording power by comparing said recording-state
15 targeted value with said value during a recording of
 information to said disk-type recording medium.

20

26. The information recording device as
claimed in claim 25, including operational
expression/coefficient setting means for setting at
least one of an operational expression and a coefficient
25 performing said predetermined calculation, in accordance

CONFIDENTIAL - GOVERNMENT EDITION

with a type of said disk-type recording medium.

5

27. The information recording device as
claimed in claim 26, including medium-type judging means
for judging the type of said disk-type recording medium
according to an identification code embedded in said
10 disk-type recording medium.

15 28. The information recording device as
claimed in claim 24, including record-pulse-width
changing means for changing a record pulse width
according to said linear velocity.

20

29. The information recording device as
claimed in claim 25, including record-pulse-width
25 changing means for changing a record pulse width

according to said linear velocity.

5

30. The information recording device as
claimed in claim 26, including record-pulse-width
changing means for changing a record pulse width
according to at least one of said linear velocity and
10 the type of said disk-type recording medium.

15

31. The information recording device as
claimed in claim 27, including record-pulse-width
changing means for changing a record pulse width
according to at least one of said linear velocity and
the type of said disk-type recording medium.

20